

NC1M120C75HTU

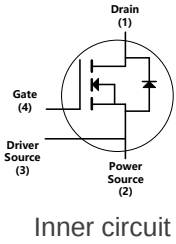
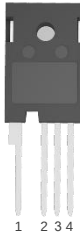
NovuSiC® 1200V 75mΩ SiC MOSFET

V_{DS}	=	1200V
$I_D@25^{\circ}C$	=	46A
$R_{DS(on)}$	=	75mΩ

Features

- High blocking voltage with low On-resistance
- High speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})

Package



Applications

- PV Inverters
- Charging Piles
- Energy storage systems
- Industrial power supply
- Industrial Motors

Marking

C1M120C75U
YYWW
XXXA

C1M120C75U = Specific device
YY = Year
WW = Work week
XXX = Wafer code
A = Assembly location

Maximum Ratings @Tc=25°C (unless otherwise specified)

Parameter	Symbol	Test conditions	Values	Unit
Drain-Source Voltage	V_{DSmax}	$V_{GS}=0V, I_D=100\mu A$	1200	V
Gate-Source Voltage (static)	V_{GSop}	Static	-5/+18	V
Continuous Drain Current	I_D	$V_{GS}=18V, T_c=25^{\circ}C$	46	A
		$V_{GS}=18V, T_c=100^{\circ}C$	33	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	70	A
Power Dissipation	P_D	$T_c=25^{\circ}C, T_j=175^{\circ}C$	288	W
Operating Junction Range	T_j		-55 to +175	°C
Storage Temperature Range	T_{stg}		-55 to +175	°C

Electrical Characteristics @Tc=25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			min.	Typ.	max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	1200	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=5mA$	-	2.2	-	V
		$V_{DS}=V_{GS}, I_D=5mA, T_j=175^\circ C$	-	1.5	-	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	-	1	-	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=18V, V_{DS}=0V$	-	10	-	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=20A$	-	75	-	m Ω
		$V_{GS}=18V, I_D=20A, T_j=175^\circ C$	-	129	-	
		$V_{GS}=15V, I_D=20A$	-	93	-	
		$V_{GS}=15V, I_D=20A, T_j=175^\circ C$	-	138	-	
Transconductance	g_{fs}	$V_{DS}=18V, I_{DS}=20A$	-	13	-	S
		$V_{DS}=18V, I_{DS}=20A, T_j=175^\circ C$	-	12	-	
Turn-On Switching Energy (Body Diode FWD)	E_{ON}	$V_{DS}=800V,$ $V_{GS}=-5V/18V, I_D=20A,$	-	278	-	μJ
Turn-Off Switching Energy (Body Diode FWD)	E_{OFF}	$R_{G(ext)}=2.5\Omega, L=200\mu H,$ $T_j=25^\circ C$ FWD=NC1M120C75HT	-	114	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=800V,$	-	11	-	ns
Rise Time	t_r	$V_{GS}=-5V/18V,$	-	25	-	
Turn-Off Delay Time	$t_{d(off)}$	$I_D=20A,$	-	21	-	
Fall Time	t_f	$R_{G(ext)}=2.5\Omega, L=200\mu H$	-	14	-	
Gate to Source Charge	Q_{gs}	$V_{DS}=800V,$	-	35	-	nC
Gate to Drain Charge	Q_{gd}	$V_{GS}=-5V/18V,$	-	25	-	
Total Gate Charge	Q_g	$I_D=20A$	-	90	-	
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=1000V$ $f=1\text{ MHz}$ $V_{AC}=25mV$	-	1402	-	pF
Output Capacitance	C_{oss}		-	67	-	
Reverse Transfer Capacitance	C_{rss}		-	18	-	
C_{OSS} Stored Energy	E_{oss}		-	41	-	μJ
Internal Gate Resistance	$R_{G(int)}$	$f=1MHz, V_{AC}=25mV$	-	2.5	-	Ω



Reverse Diode Characteristics @Tc=25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode Forward Voltage	V _{SD}	V _{GS} =-5V, I _{SD} =10A	-	4.9	-	V
		V _{GS} =-5V, I _{SD} =10A, T _j =175°C	-	4.0	-	V
Continuous Diode Forward Current	I _S	V _{GS} =-5V	-	48	-	A
Reverse Recovery time	t _{rr}	V _{GS} =-5V, I _{SD} =20A, V _R =800V, di/dt=2630A/μs	-	22	-	ns
Reverse Recovery Charge	Q _{rr}		-	235	-	nC
Peak Reverse Recovery Current	I _{rrm}		-	21	-	A

Thermal Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal Resistance from Junction to Case	R _{θJC}		-	0.52	-	°C/W



Typical Performance

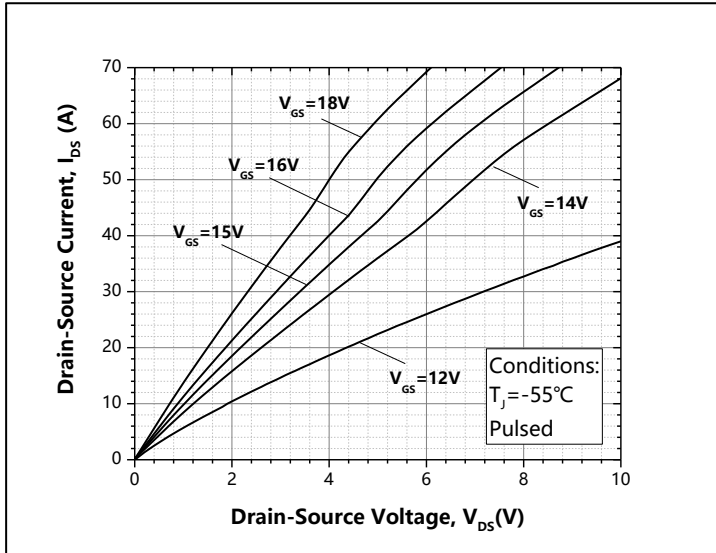


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

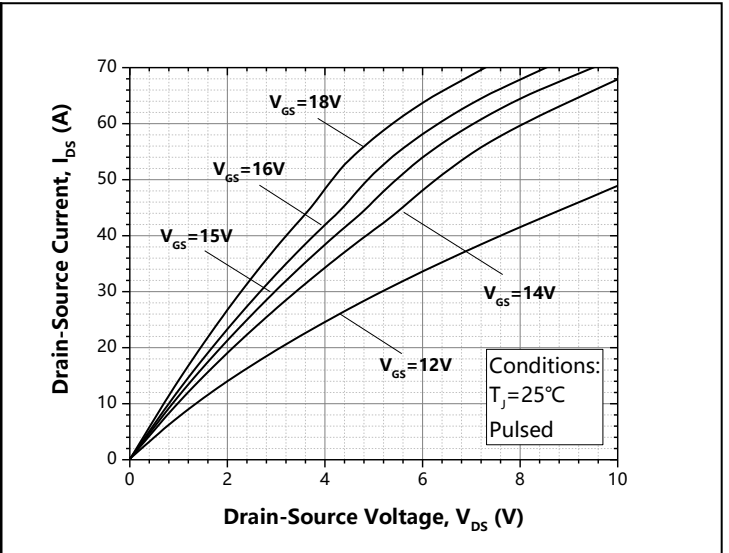


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

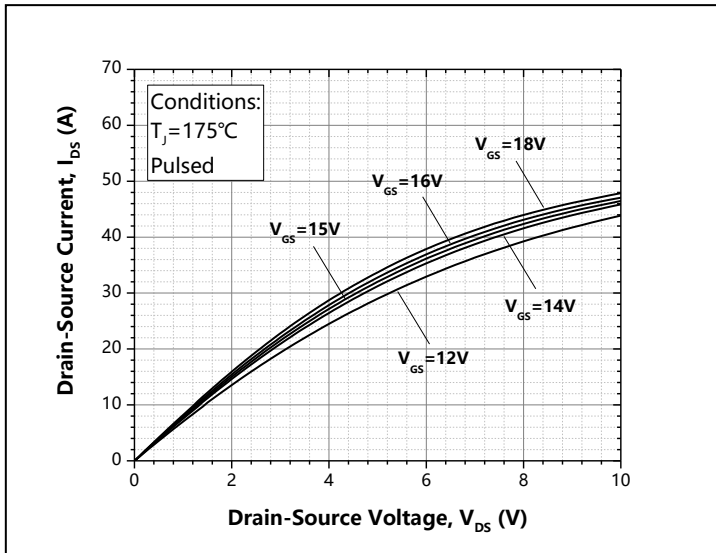


Figure 3. Output Characteristics $T_J = 175^\circ\text{C}$

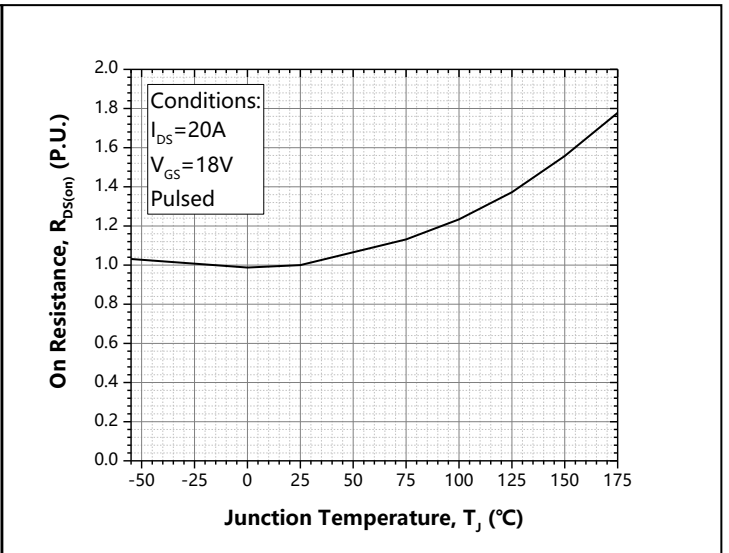


Figure 4. Normalized On-Resistance vs. Temperature



Typical Performance

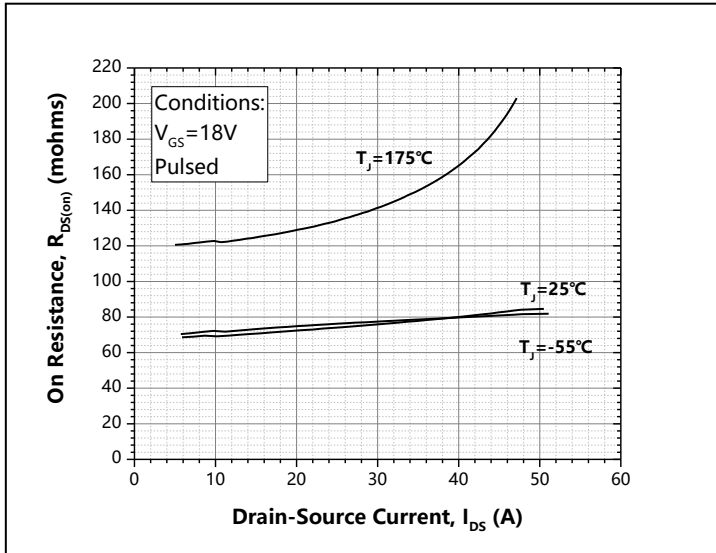


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

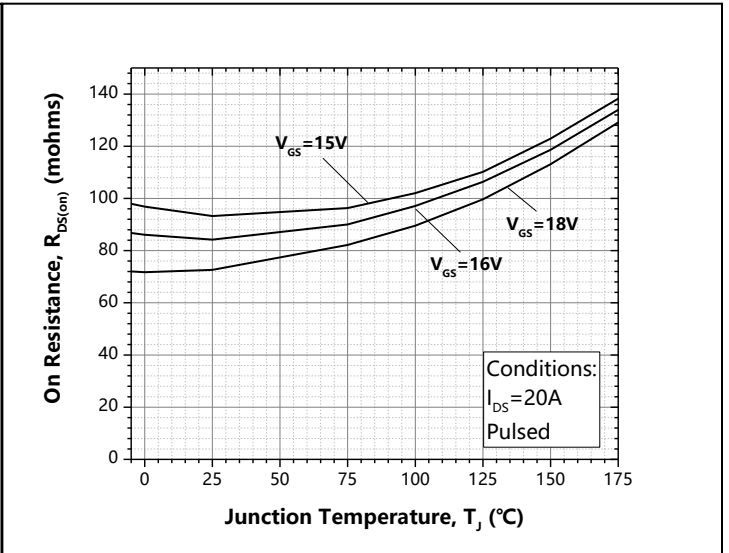


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

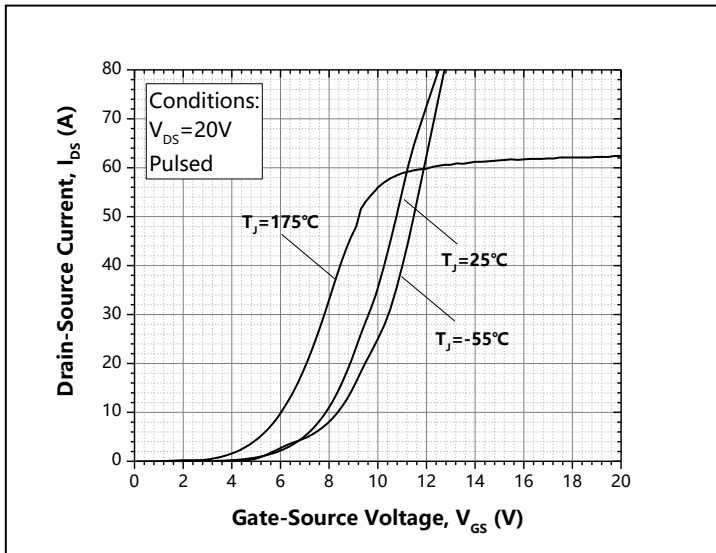


Figure 7. Transfer Characteristic for Various Junction Temperatures

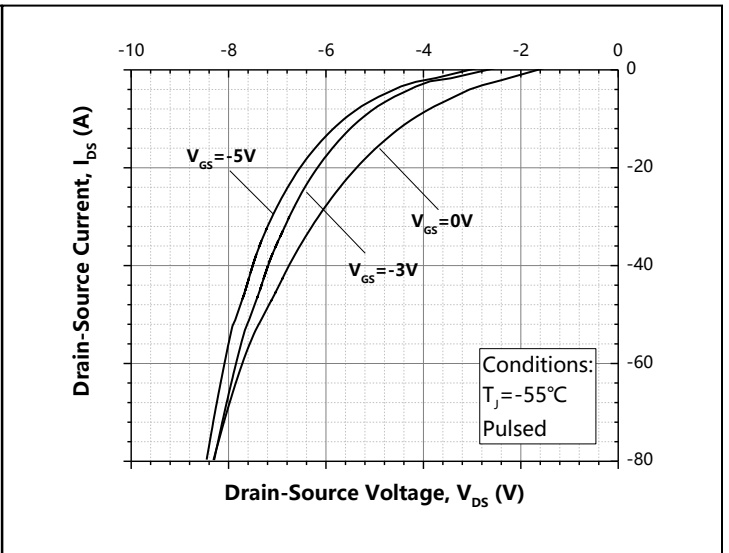


Figure 8. Body Diode Characteristic at -55°C



Typical Performance

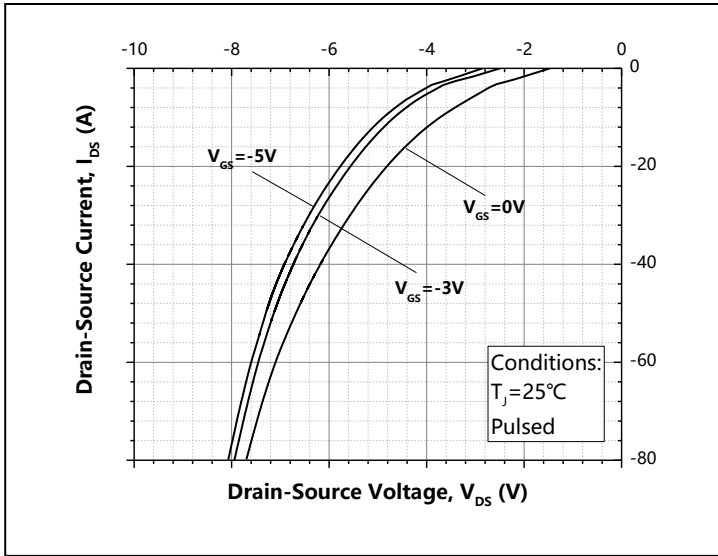


Figure 9. Body Diode Characteristic at 25°C

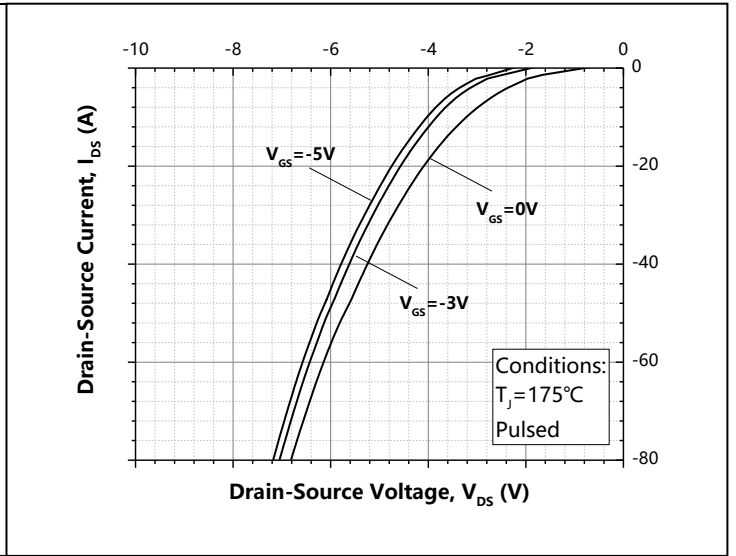


Figure 10. Body Diode Characteristic at 175°C

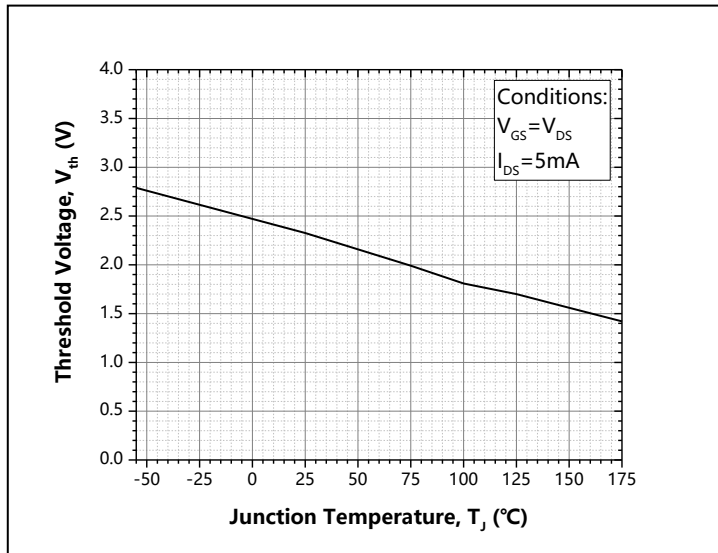


Figure 11. Threshold Voltage vs. Temperature

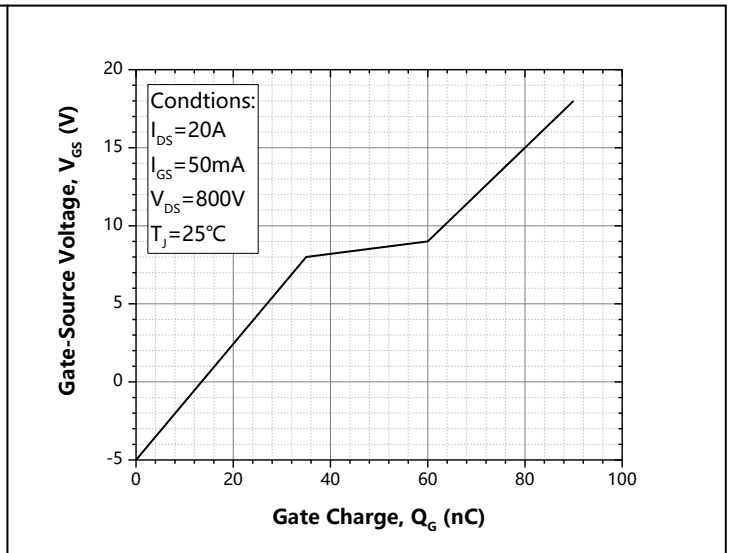


Figure 12. Gate Charge Characteristics



Typical Performance

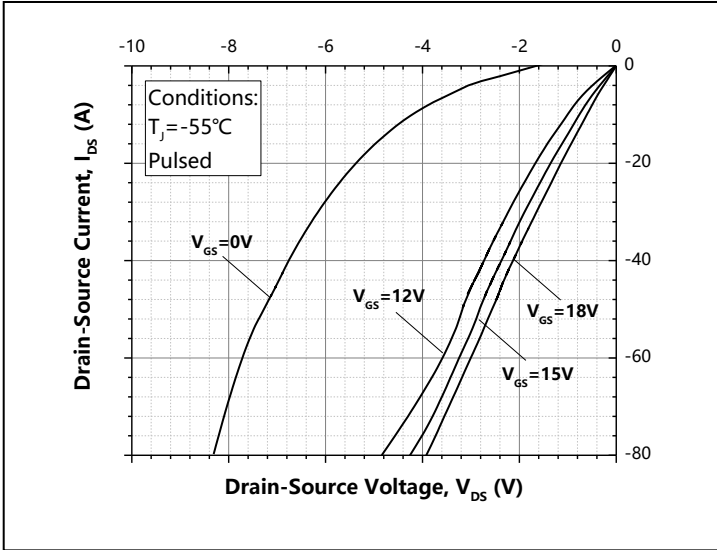


Figure 13. 3rd Quadrant Characteristic at -55°C

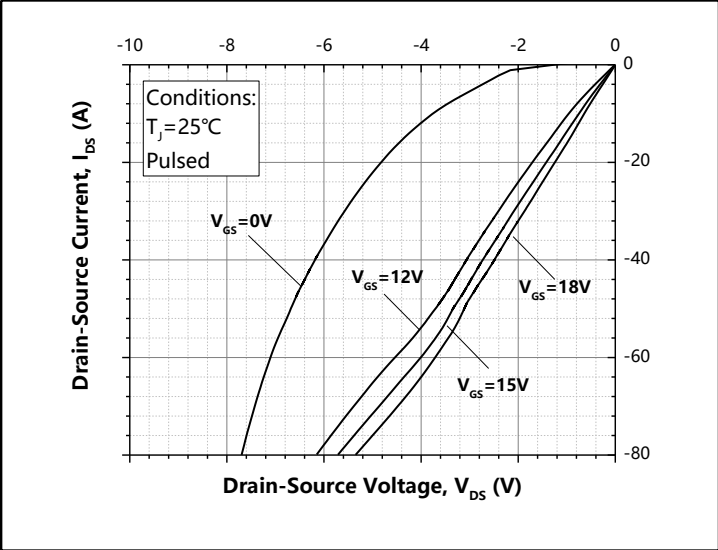


Figure 14. 3rd Quadrant Characteristic at 25°C

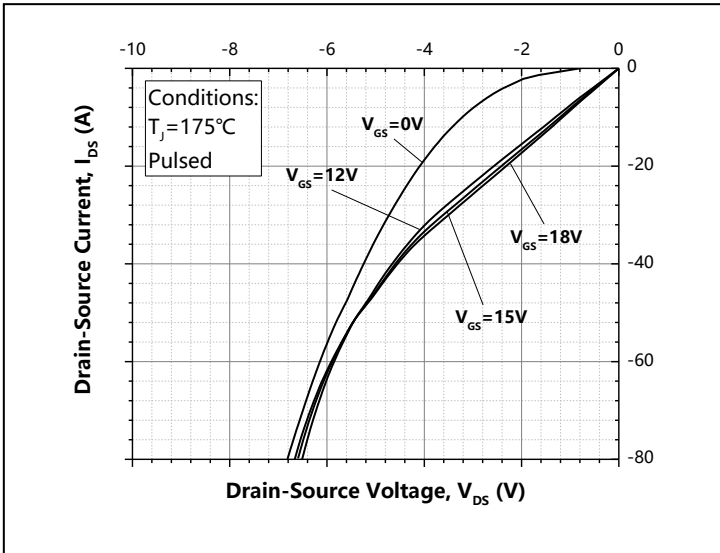


Figure 15. 3rd Quadrant Characteristic at 175°C

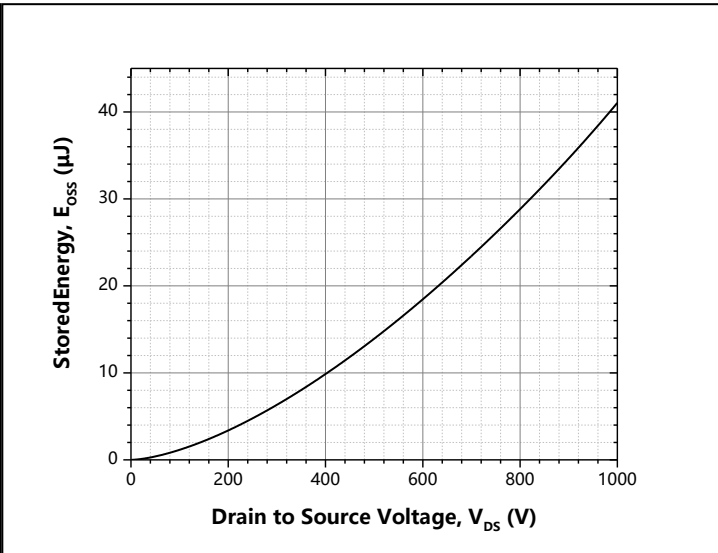


Figure 16. Output Capacitor Stored Energy



Typical Performance

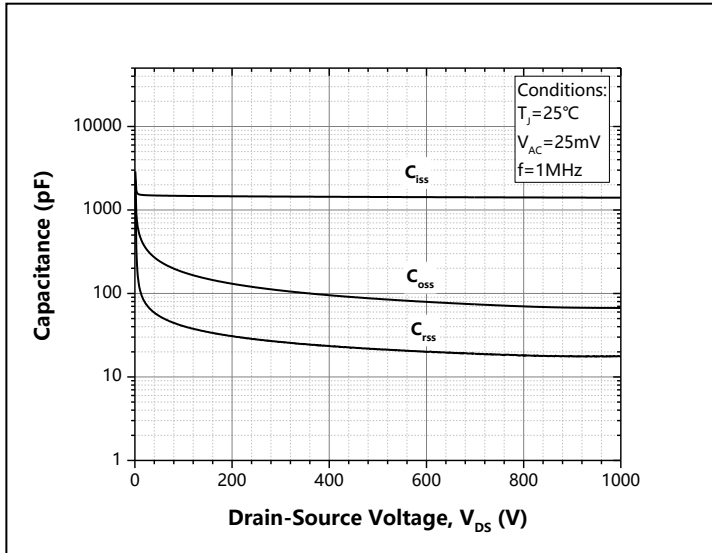


Figure 17. Capacitances vs. Drain-Source Voltage

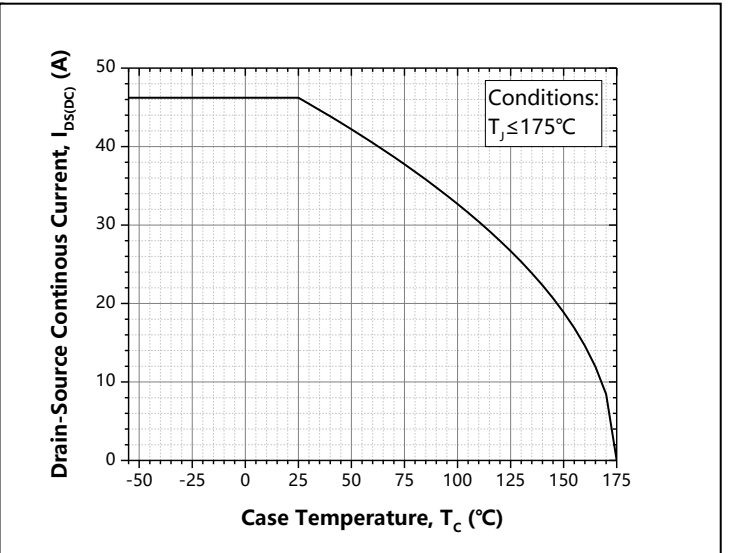


Figure 18. Continuous Drain Current Derating vs. Case Temperature

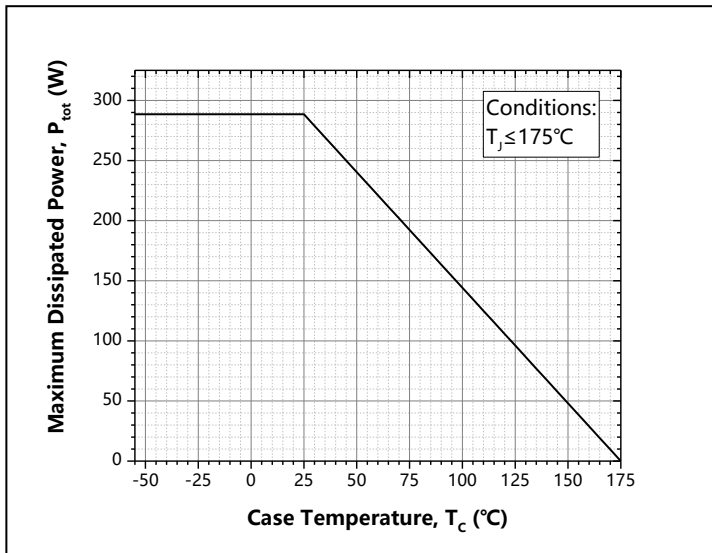


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

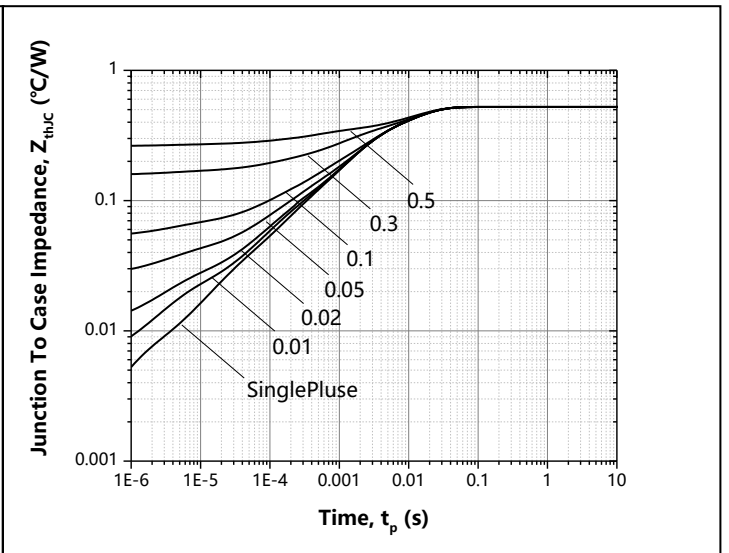


Figure 20. Transient Thermal Impedance (Junction - Case)



Typical Performance

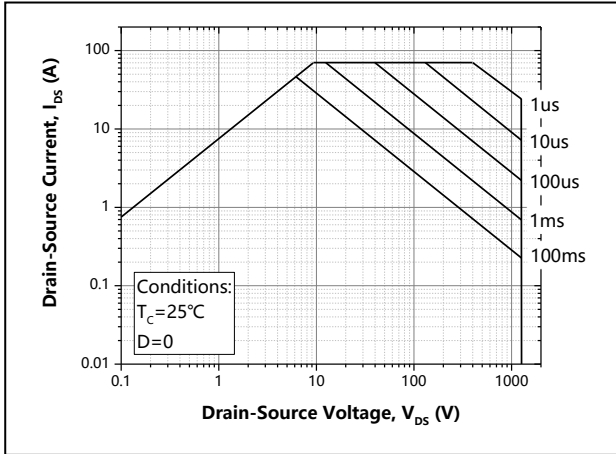


Figure 21. Safe Operating Area

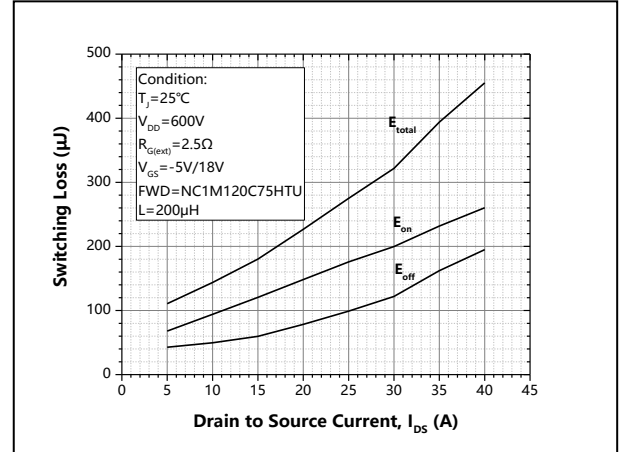


Figure 22. Clamped Inductive Switching Energy vs. Drain Current ($V_{DS} = 600\text{V}$)

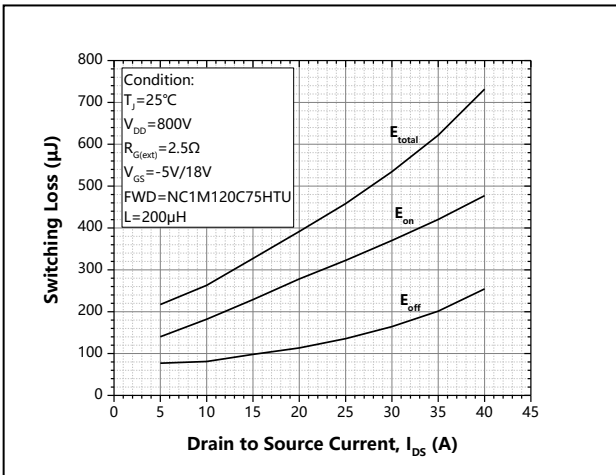


Figure 23. Clamped Inductive Switching Energy vs. Drain Current ($V_{DS} = 800\text{V}$)

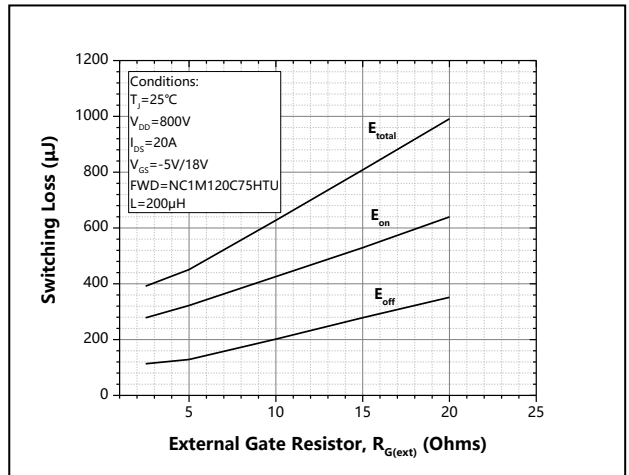


Figure 24. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

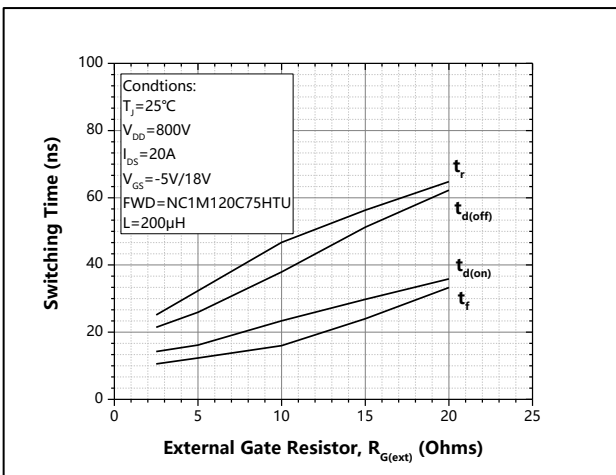
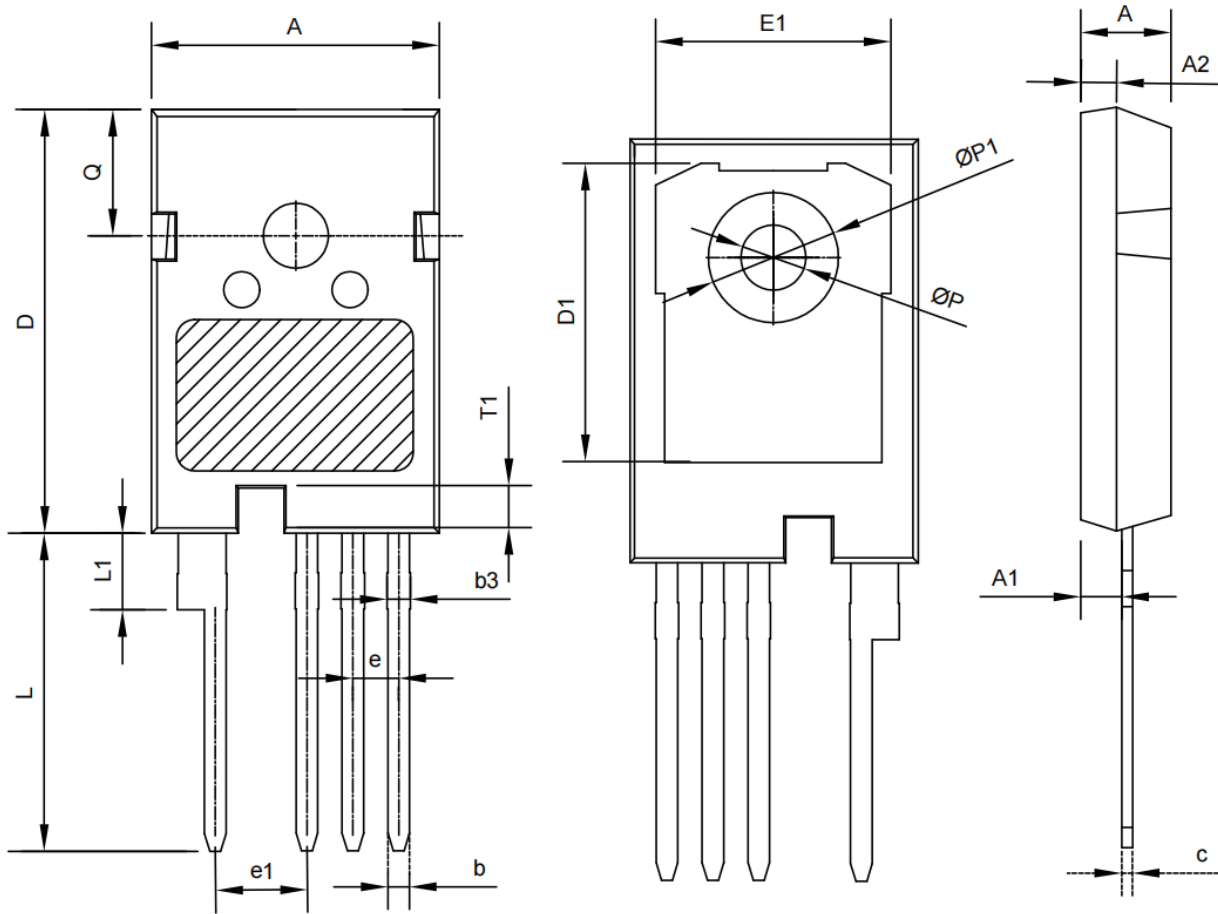


Figure 25. Switching Time vs. $R_{G(ext)}$



Package Outline: TO-247-4L



SYMBOL	MILIMETERS		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.80	2.00	2.20
b	1.06	1.21	1.36
b1	2.33	2.63	2.93
b3	1.07	1.30	1.60
c	0.51	0.61	0.75
D	23.30	23.45	23.60
D1	16.25	16.55	16.85
E	15.74	15.94	16.14
E1	13.74	14.02	14.32
T1	2.35	2.50	2.65
e	2.54 BSC		
e1	5.08 BSC		
Q	5.49	5.79	
L	17.27	17.57	
L1	3.99	4.19	
ØP	3.40	3.60	3.80
ØP1	7.19 REF		

NOTE:

1. ALL DIMENSIONS ARE LISTED IN MILLIMETERS, ANGLES ARE IN DEGREES.
2. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.



Product Ordering Information

Order Number	Packing Type
NC1M120C75HTU	Tube

Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	16 Mar. 2023	Official first release
1.1	17 Mar. 2023	$R_{\theta JC}$ has been changed from 5.2°C/W to 0.52°C/W

Disclaimer

Novus Semiconductors Co., Ltd. ("NOVUSEM") reserve the right to make changes, corrections, enhancements, modifications, and improvements to NOVUSEM products and/or to this document at any time without notice. Purchasers should obtain the late NOVUSEM relevant information on NOVUSEM products before placing orders. NOVUSEM products are sold pursuant to NOVUSEM's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of NOVUSEM products and NOVUSEM assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by NOVUSEM herein.

Resale of NOVUSEM products with provisions different from the information set forth herein shall void any warranty granted by NOVUSEM for such product.

NOVUSEM and the NOVUSEM logo are trademarks of NOVUSEM. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2023 Novus Semiconductors Co., Ltd. – All rights reserved.